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RECREATION AREA
(NEWTOWN DEVELOPMENT)
PRELIMINARY SOIL REPORT

WAIMALU, EWA, OAHU, HAWAII
TAX MAP KEY: 9-8-02: POR. 9

To:
COMMUNITY PLANNING, INC.

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

MARCH 25, 1974

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

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March 25, 1974

MR. GEORGE HOUGHTAILING
Community Planning, Inc.
700 Bishop Street, Suite 608
Honolulu, Hawaii 96813

Gentlemen:

Subject: Recreation Area
(Newtown Development)
Preliminary Soil Report
(for site grading design for recreational development)
Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

Transmitted herewith is a preliminary soil report for site grading design considerations at the site of the Recreation Area (Newtown Development) at Waimalu, Ewa, Oahu, Hawaii.

This report includes a Boring Location Sketch, boring logs, laboratory test results, recommendations and limitations.

Respectfully submitted,

WALTER LUM ASSOCIATES, INC.

By Ezra Koike
Ezra Koike

CR/EK:rmf

C O N T E N T S

RECREATION AREA
(NEWTOWN DEVELOPMENT)
PRELIMINARY SOIL REPORT

WAIMALU. EWA. OAHU, HAWAII
TAX MAP KEY: 9-8-02: POR. 9

SCOPE OF EXPLORATION

The purpose of this exploration was to evaluate general soil conditions for site grading design considerations for the proposed Recreation Area (Newtown Development) Waimalu, Ewa, Oahu, Hawaii.

This report includes field explorations, laboratory tests and general recommendations for site grading design considerations and limitations.

FIELD EXPLORATION

Nine exploratory borings were made at the site. Descriptions of the underlying soils encountered are shown on Boring Logs Nos. 1 thru 9. The approximate locations of these borings are shown on the Boring Location Sketch.

The borings were made with 4-in. diameter augers using a carbide drag bit. Soil samples were recovered with 2-in. o.d. thin-wall tube samplers and a standard split spoon sampler driven with a 140-lb hammer falling 30 inches. Rock samples were recovered with an "AX" double tube core barrel using a carbide coring bit.

LABORATORY TESTS

Laboratory tests included: natural water content and density, unconfined compression, Atterberg limit, grain-size analysis, specific gravity, AASHO T-180-73I density, and CBR.

A summary of the laboratory test results is given in Tables IA thru IC.

SOIL CLASSIFICATION SYSTEM

Soil samples were visually observed and subjected to appropriate tests in the laboratory. Based on visual observations and laboratory tests, the soil descriptions given on the boring logs are generally made in accordance with the "Unified Soil Classification System."

SOIL DESCRIPTIONS BY OTHERS

From a review of geologic and soil maps of the area, the soils described by others are as follows:

Stearns, "Geologic and Topographic Map, Island of Oahu, USGA, 1938":

Tkb - Koolau volcanic series

U. S. Soil Conservation Service, "Soil Survey of Islands Of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii," August 1972:

MpE - Manana silty clay, 25 to 40 percent slopes
Unified Soil Classification - MH;
shrink-swell potential, moderate

GENERAL SITE CONDITIONS

Site Location

The proposed recreational site is part of the Newtown Development. The site is located about 2/10 mile northeast of the intersection of Komo Mai Drive and Kaahele Street (under construction).

Annual Rainfall

The average annual rainfall varies from about 40 to 50 inches.

Topography

The proposed recreational site is an existing gully. The bottom of the gully slopes downward towards the west at about 10 to 30% gradients with localized variations. The existing side slopes generally vary from about 15 to 35% gradients with localized variations.

The site is an abandoned sugarcane field. Irrigation ditches cross the site.

INTERPRETATION OF SOIL CONDITIONS

From the field exploration and laboratory test results, the soils encountered in the borings may be generally approximated as follows:

Surface layers of stiff reddish-brown silty clays (MH) and some clays (CH) with decomposed rock, cobbles and boulders.

Water was not noted in the borings during the field explorations.

Variations to the above soil conditions are to be expected in localized areas. For more detailed descriptions of soils encountered in the borings, refer to the boring logs.

DISCUSSION AND RECOMMENDATIONS

In general, the present plan is to clear and grade the site for future recreational development. The preliminary plans generally indicate fills of up to about 30 to 50 ft in height in localized sections.

Because of the heights of fills contemplated, the grading design should consider care in the site preparation and construction of fills.

After clearing and grubbing, the bottoms and sides of the gully should be stripped of loose soils before the placement of fills.

Subdrains should be placed along the bottoms and sides of the gully in a herringbone pattern and the outlet daylighted well beyond the toe of the slope.

New fills should be keyed into stiff natural ground.

The fill at the low side of the gully should be constructed with a rock buttress, if practicable. The area under the outer portion of the slope

should be stripped down to stiff soils and to a fairly level condition. A blanket of fairly well-graded granular material should be placed on the bottom and a boulder fill constructed on it.

Settlement gages should be installed and periodic level readings taken to monitor the performance of the fills over the existing gully.

Site Grading

Selected on-site or approved off-site borrow soils may be considered for the fill construction.

Grading work should be done as required by the Revised Ordinances of Honolulu, 1969 As Amended; and as recommended below:

1. The area should be cleared and grubbed. Surface vegetation, rubbish, debris and abandoned structures should generally be cleared and removed prior to site filling.

2. Topsoil and stockpiled soils should be stripped to stiff natural ground before the placement of fills.

3. Soft spots or "CH" clay pockets encountered during site preparation should be excavated and replaced with select material compacted in thin lifts.

4. Hard surfaces in localized areas should be scarified down to stiff soils and recompacted to match the density of the surrounding soil.

5. Loose surface soils along the bottoms and sides of the existing gully should be stripped down to stiff natural ground.

6. Trenches should be cut in a herringbone pattern along the bottoms and sides of the gully before the placement of fills. Subdrains should be placed in the trenches. The locations of subdrains should be determined in the field after clearing and grubbing.

7. Thin sidehill fills (sliver fills) on sloping areas should be avoided.

8. Fills should be constructed in approximately level layers starting at the lower end and working upward. Where fills are made on sloping areas steeper than about 5 horizontal to 1 vertical, the ground at the toe of the fill should be benched to a generally level

condition. As the fill is brought up, it should continually be keyed into the stiff natural ground by cutting steps into the slopes and compacting the fill into these steps.

9. If boulders are proposed to be used in the construction of fills, they should be generally placed along the toe section of the fill slope. Before placing any boulders, the subgrade should be stripped to stiff natural ground and shaped to drain. A transition layer of select granular material (6-in. to dust sizes) should be placed on the subgrade and the boulders placed on the select material. A transition layer of select granular material should also be placed against the boulders before earth fills are placed against the boulders. Earth fill may be used in void spaces between boulders. See attached sketch, Figure 1.

10. Fills should be laid in 6-in. compacted layers to 90% of the maximum density determined by the AASHO T-180-73I test method.

11. Provisions to drain the site should be included during and after the completion of filling operations.

Slopes

In general, for localized areas, fill slopes of 2 horizontal to 1 vertical or flatter should be used for heights of 15 ft or less.

For the buttress fill at the toe of the gully, a 3 to 1 slope with subdrains is recommended.

For the longitudinal slope up the gully, the average slope of the surface should be limited to about 5 to 1.

For slope heights (top to toe) greater than 15 ft, 8-ft-wide benches should generally be placed at height intervals of about 15 ft.

Where flatter slopes of about 4 horizontal to 1 vertical and flatter are designed, deletion of benches may be considered on an individual basis.

To minimize erosion, the runoff from rainstorms should be diverted by berms or ditches away from slopes whenever practicable.

The surface of fill slopes should be compacted by cat-tracking or with a sheepsfoot roller.

Slope planting is recommended on cut and fill slopes to minimize erosion.

Slope adjustments or other precautions may be necessary if seepage zones or expansive clay pockets are encountered in localized areas. In general, when clay pockets are encountered in slopes, they should be removed and replaced with selected on-site or borrow soils compacted in thin lifts.

Foundations

In general, light recreational structures may be constructed on the compacted fill.

To minimize the possibility of undetected soft spots and other unforeseen conditions, should structures be planned at a later date, additional soil explorations should be considered on an individual basis at each building site.

In general, construction of buildings on fills over gullies should be delayed as long as practicable to allow the fills and surrounding ground to adjust to the new load environment.

Settlement observations should be considered to get an indication of the performance of the fills and to get an indication when movements may be within the tolerances for the structures planned.

Utilities

Utilities should be placed after the fills are constructed. Utility lines should be designed with flexible joints, particularly where lines are connected to structures.

Subdrains or filter material should be placed at the bottoms of trenches to provide drainage paths that daylight at low points.

To minimize erosion on the slope, drainage outlets should be placed well beyond the toe of slope.

Unforeseen Conditions

Because of the variability of soil deposits, site improvements, designs and construction techniques, conditions may be encountered that cannot be foreseen with even the most exhaustive studies of site and project conditions. These unforeseen conditions should be recognized and then evaluated so that the designs or the construction methods may be modified accordingly, if necessary.

Unforeseen or undetected conditions such as soft spots, existing utility trenches, structure foundations, voids or cavities, old tunnels, boulders, expansive soil pockets or seepage water, etc., may occur in localized areas and will have to be adjusted and corrected in the field as they are detected.

Site Regrading

After mass grading work is done and cuts and fills are made according to the grading plans, regrading at some future date should be avoided unless done under the guidance of a soils engineer.

PROPOSED SPECIFICATION FOR EARTHWORK

RECREATION AREA (NEWTOWN DEVELOPMENT)

General Description

This item shall consist of clearing and grubbing, preparing of land to be filled, excavating and filling of the land, spreading, compacting and testing of the fill, and subsidiary work for grading the site.

Clearing, Grubbing and Preparing Areas to be Filled

Vegetation, rubbish and miscellaneous material shall be removed and disposed of, leaving the disturbed area with a neat, debris-free appearance.

Topsoil and stockpiled soils shall be stripped to stiff natural ground before the placement of fills. Loose surface soils encountered at finish grade shall be scarified and recompacted.

Hard surfaces of existing haul roads shall be scarified down to stiff soils and recompacted to match the density of the surrounding soil.

The bottoms and sides of gullies or natural drainageways shall be stripped down to stiff natural ground before the placement of fills.

Trenches shall be cut in a herringbone pattern and subdrains placed in the trenches to provide drainage paths for the bottoms and sides of natural drainageways or dips before the placement of fills.

Where fills are made on sloping areas steeper than 5 horizontal to 1 vertical, the ground at the toe of the slope shall be benched to a generally level condition. As the fill is brought up, it shall be continually keyed into the stiff natural ground by cutting steps into the slopes and compacting the fill into these steps.

Materials

Fill material shall consist of selected on-site soils or approved borrow soils. The soils shall contain no more than a trace of organic and deleterious matter.

Borrow soils shall be select soils generally less than 6-in. maximum size, with more than 30% fines and a plasticity index generally less than 20.

Fill material placed in the top 2 ft of fills shall contain less than 30% gravel.

Placing, Spreading and Compacting Fill Material

The selected fill material shall be placed in level layers which, when compacted, shall not exceed 6 inches. Each layer shall be spread evenly and blade-mixed during the spreading to attain uniformity of material and water content within each layer.

Rocks or cobbles shall not be allowed to nest and voids between rocks shall be filled and compacted with small stones or earth.

When the water content of the fill material is well below the optimum for compacting purposes, water shall be added until the water content is near the optimum.

When the water content of the material is well above the optimum for compacting purposes, the fill material shall be aerated by blading or by other satisfactory methods until the water content is near the optimum.

After each layer has been placed, mixed and spread evenly, it shall be compacted to 90% of maximum density in accordance with AASHO Test No. T-180-73I or other comparable density tests. Compaction shall be with sheepsfoot rollers, multiple-wheel pneumatic-tired rollers or other acceptable rollers which shall be able to compact the fill to the specified density. Rolling shall be accomplished while the fill material is at the specified water content. The rolling of each layer shall be continuous over the area and the roller shall make sufficient passes to obtain the desired density.

Field density tests shall be made to get an indication of the compaction of the fill. Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several inches. Density readings shall be taken as often as necessary in the compacted material below the disturbed surface. When these readings indicate that the density of a layer of fill or portion thereof is below the required density, that layer or portion shall be reworked until the required density has been obtained.

The fill operation shall be continued in 6-in. compacted layers, as specified above, until the fill has been brought to the finished slopes and grades as shown on the accepted plans.

Boulder Fills

If boulders are used for the construction of fills, they shall be generally placed along the toe section of slopes and outside of probable building sites. The subgrade shall be stripped to stiff natural ground,

shaped to drain and a transition layer of select granular material (6-in. to dust sizes) shall be placed on it. The boulders shall be placed on the select granular material. A transition layer of select granular material shall be placed against the boulders before construction of earth fills against the boulders. Earth fill may be used in the void spaces between boulders.

Excavation

Suitable material from excavation shall be used in the fill and unsuitable material from excavation shall be disposed of.

Unforeseen Conditions

If unforeseen or undetected soil conditions such as soft spots, existing utility trenches, structure foundations, voids or cavities, old tunnels, boulders, seepage water or expansive soil pockets, etc., are encountered, corrective measures shall be made in the field as they are detected.

Rainy Weather

Fill material shall not be placed, spread or rolled during unfavorable weather conditions. When the work is interrupted by heavy rain, fill operations shall not be resumed until field tests indicate that the water content and density are as previously specified.

BORING LOGS

The stratification lines shown on each of the boring logs represent the approximate boundary between soil types and the transition may be gradual.

Symbols

Symbols used generally are in accordance with the Unified Soil Classification System.

Where a parenthesis "(MH)" is used, the soil sample was classified by visual observation of the sample recovered.

Where no parenthesis "MH" is used, the soil sample was classified from either the Atterberg limit or sieve analysis test results.

NEWTOWN REC. CENTER

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: RECREATION AREA (NEWTOWN DEVELOPMENT)

LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

HAMMER:
Weight: 140#
Drop: 30"

SAMPLER: 2"SS - 2" O.D. THIN WALL TUBE
2"SS - 2" STANDARD SPLIT SPOON

BORING NO. 1 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date MAR. 7, 1974
Field Party KAKU, KAU
Type of Boring AUGER (VERSA DRILL) Diam. 4"
Elev. 402'± * Datum —
Drill Bit T.C. DRAG

Water Level	NOT NOTICED			
Time	—			
Date	3-7-74			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40	PENETRATION DATA: 2" O.D. THIN WALL TUBE SAMPLER BLOWS/0.5'
	ELEV. = 402'± *	0									
(MH)	STIFF, REDDISH BROWN SILTY CLAY		2"S	1-A	126	26	100	5,670	–		3/0.5' 8/0.5'
			2"SS	1-B	–	29	–	–	–		
(MH)	STIFF, REDDISH BROWN W/TRACES OF GRAY SILTY CLAY	5	2"S	1-C	129	33	97	22,220	–		7/0.5' 12/0.5'
(MH)	STIFF, MOTTLED BROWN SILTY CLAY	10	2"SS	1-D	–	44	–	–	–		41
(MH)	STIFF, MOTTLED GRAY & RED SILTY CLAY	15	2"SS	1-E	–	49	–	–	–		
(MH)	LIGHT GRAY & MOTTLED BROWN CLAYEY SILT					42					
(MH)	STIFF, MOTTLED BROWN W/LIGHT GRAY CLAYEY SILT W/ DECOMPOSED ROCK	20	2"SS	1-F	–	45	–	–	–		
	DENSE MOTTLED GRAY DECOMPOSED ROCK W/SILTY SAND	25	2"SS	1-G	–	40	–	–	–		74
	END OF BORING @ 26.5'± 3-7-74										

*Elev. Estimated from Grading Plan by Community Planning, Inc. Dated 1/11/74

NEWTOWN REC. CENTER

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: RECREATION AREA (NEWTOWN DEVELOPMENT)
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

HAMMER: Weight 140# Drop 30"
SAMPLER: 2"SS - 2" O.D. THIN WALL TUBE; 2"SS - 2" STANDARD SPLIT SPOON

BORING NO. 2 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date FEB. 22 & 25, 1974
Field Party KAKU, SHIGENAGA
Type of Boring AUGER (VERSA DRILL) Diam. 4"
Elev. 433'± * Datum —
Drill Bit T.C. DRAG

Water Level				
Time	—			
Date	2-22-74			

Unified Soil Classification	DESCRIPTION (ELEV. = 433'± ↓ * 0)	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40	PENETRATION DATA: 2" O.D. THIN WALL TUBE SAMPLER BLOWS/0.5'
(MH)	STIFF, MOTTLED REDDISH BROWN SILTY CLAY		2"SS	2-A	–	37	–	–	–		
			2"S	2-B	112	37	82	1530	–		4/0.5' 7/0.5'
		5	2"SS	2-C	–	35	–	–	–		
(MH)	STIFF, MOTTLED REDDISH BROWN SILTY CLAY W/TRACES OF DECOMPOSED ROCK										
		10	2"S	2-D	116	39	83	14,100	–		8/0.5' 15/0.5'
			2"SS	2-E	–	37	–	–	–		30/0.5'
	MOTTLED GRAY DECOMPOSED ROCK	20	2"SS	2-F	–	18	–	–	–		40/0.3' HAMMER BOUNCES
(MH)	MOTTLED BROWN SILTY CLAY	25	2"SS	2-G	–	42 17	–	–	–		40/0.4' HAMMER BOUNCES
	BROWN DECOMPOSED ROCK										
	END OF BORING @ 25.9' 2-25-74										

*Elev. Estimated from Grading Plan by Community Planning, Inc. Dated 1/11/74

NEWTOWN REC. CENTER

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: RECREATION AREA (NEWTOWN DEVELOPMENT)
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

HAMMER:
Weight: 140#
Drop: 30"
SAMPLER: 2" SS - 2" O.D. THIN WALL TUBE
2" SS - 2" STANDARD SPLIT SPOON

BORING NO. 3 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date FEB. 25, 1974
Field Party KAKU, OMORI
Type of Boring AUGER (VERSA DRILL) Diam. 4"
Elev. 440'± Datum —
Drill Bit T.C. DRAG
Water Level NOT NOTICED
Time —
Date 2-25-74

Unified Soil Classification	DESCRIPTION (ELEV. = 440'± *)	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	Standard Penetration Test N (Blows per foot)	2" O.D. THIN WALL TUBE SAMPLER BLOWS/0.5'
(MH)	STIFF, REDDISH BROWN SILTY CLAY	0	2"S	3-A	128	35	95	5,250	—		4/0.5' 6/0.5'
MH	MEDIUM MOTTLED REDDISH BROWN SILTY CLAY W/TRACES OF DECOMPOSED ROCK		2"SS	3-B	—	42 LL= 74 PL= 38	—	—	—		
(MH)	MOTTLED RED BROWN CLAYEY SILT (DECOMPOSED ROCK)	5	2"S	3-C	115	45	79	—	—		3/0.5' 5/0.5'
MH	STIFF, MOTTLED BROWN CLAYEY SILT W/ DECOMPOSED ROCK	10	2"SS	3-D	—	37 LL= 64 PL= 51	—	—	—		51
	GRAY DECOMPOSED ROCK (CRUSHES TO CLAYEY SILT)	15	2"S	3-E	106	46	73	3,870	—		7/0.5' 9/0.5'
MH	STIFF MOTTLED BROWN & GRAY CLAYEY SILT W/ DECOMPOSED ROCK	20	2"SS	3-F	—	51 LL= 61 PL= 42	—	—	—		
MH	STIFF, MOTTLED BROWN CLAYEY SILT W/SAND & DECOMPOSED ROCK	25	2"SS	3-G	—	55 LL= 71 PL= 42	—	—	—		
	END OF BORING @ 27' 2-25-74										

NOTE
LL= LIQUID LIMIT
PL= PLASTIC LIMIT

*Elev. Estimated from Grading Plan by Community Planning, Inc. Dated 1/11/74

NEWTOWN REC. CTR.

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: RECREATION AREA (NEWTOWN DEVELOPMENT)
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

HAMMER:
Weight: 140#
Drop: 30"
SAMPLER: 2" SS - 2" STANDARD SPLIT SPOON

BORING NO. 4 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date MAR. 15, 1974
Field Party KAKU, OMORI
Type of Boring AUGER (VERSA DRILL) Diam. 4"
Elev. 275'± * Datum —
Drill Bit T.C. DRAG

Water Level				
Time				
Date				

Unified Soil Classification	DESCRIPTION ELEV. = 275'± *	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test (N, Blows per foot: 0 10 20 30 40)	PENETRATION DATA: 2" O.D. THIN WALL TUBE SAMPLER (BLOWS/0.5')
(MH)	STIFF, MOTTLED BROWN SILTY CLAY W/ SOME DECOMPOSED ROCK	0	2"S	4-A	115	34	86	5180			4/0.5' 7/0.5'
	MOTTLED BROWN DECOMPOSED ROCK W/ SILTY CLAY		2"S	4-B	118	43	82	4190			6/0.5' 8/0.5'
		5	2"S	4-C		48					4/0.5' 7/0.5'
(MH)	STIFF, RED & GRAY SILTY CLAY										
	COBBLES OR BOULDER	10	2"SS	4-D	NO RECOVERY						40/0.1' HAMMER BOUNCES
	NOTE: DRILL TIME 10'-11' 45 MIN.. MOVED HOLE 5' AWAY. 8.5'-10.0 45 MIN.. 10'-14' 1 HR. 15 MIN.										
	END OF BORING @ 14' 3-15-74		2"SS	4-E	NO RECOVERY						50/0.0' HAMMER BOUNCES

*Elev. Estimated from Grading Plan by Community Planning, Inc. Dated 1/11/74

NEWTOWN REC. CENTER

WALTER LUM ASSOCIATES, INC. [redacted] 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: RECREATION AREA (NEWTOWN DEVELOPMENT)

LOCATION: Waimalu, Ewa, Oahu, Hawaii

Tax Map Key: 9-8-02: Por. 9

HAMMER:
Weight 140#
Drop 30"

SAMPLER: 2" STANDARD SPLIT SPOON

BORING NO. 5 Sheet No. ____ of ____

Driller W. LUM ASSOC., INC. Date MAR. 9, 1974

Field Party MEYER, KAKU, CHOW

Type of Boring AUGER (VERSA DRILL) Diam. 4"

Elev. 350'± * Datum —

Drill Bit T.C. DRAG

Water Level					
	NOT NOTICED				
Time	—				
Date	3-9-74				

Unified Soil Classification	DRILL RATE	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test, N (Blows per foot) 0 10 20 30 40
		ELEV. = 350'± *	0								
(MH)	2.1'-5.0' 25 MIN.	STIFF MOTTLED REDDISH BROWN SILTY CLAY W/TRACES OF ROOTS & DECOMPOSED ROCK			5-A	—	36	—	—	—	40/0.1' HAMMER BOUNCES
	5.0'-10.0' 15 MIN.	DECOMPOSED COBBLE OR BOULDER ?	5	HARD	5-B	NO RECOVERY					30/0.0' HAMMER BOUNCES
(MH)		STIFF MOTTLED REDDISH BROWN SILTY CLAY W/TRACES OF DECOMPOSED ROCK	10		5-C	—	32 12	—	—	—	40/0.5' HAMMER BOUNCES
	11.0'-15.0' 45 MIN.	GRAY BROWN, DECOMPOSED PUKA PUKA ROCK BLUE PUKA PUKA ROCK	15	RHD	5-D	NO RECOVERY					30/0.0' HAMMER BOUNCES
	15.0'-15.5' 45 MIN	END OF BORING @ 15.5' 3-9-74									

*Elev. Estimated from Grading Plan by Community Planning, Inc. Dated 1/11/74

NEWTOWN RECREATION CENTER

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: RECREATION AREA (NEWTOWN DEVELOPMENT)

LOCATION: Waimalu, Ewa, Oahu, Hawaii

Tax Map Key: 9-8-02: Por. 9

HAMMER:
Weight: 140#
Drop: 30"

SAMPLER: "AX"- AX DOUBLE TUBE CORE BARREL 2"SS-2" STANDARD SPLIT SPOON

BORING NO. 5A Sheet No. ____ of ____

Driller: W. LUM ASSOC., INC. Date: MAR. 9, 13 & 14, 1974

Field Party: KAKU, OMORI

Type of Boring: CORING & ROTARY (VERSA DRILL) Diam.: "AX" & 4"

Elev.: 350'± Datum: ____

Drill Bit: T.C. CORING & ROLLER ROCK

Water Level					
Time					
Date					

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test, N (Blows per foot) 0 10 20 30 40
	ELEV. = 350'± *	0								
	NOTE: SEE BORING 5. MOVED HOLE 5' AWAY AUGERED 0' TO 6'.									
	BOULDER OR LAVA ROCK	5	"AX"	RUN #1		CORED: 2.0' RECOV.: 1.7'				
	REDDISH BROWN CLINKER ?	10	"AX"	RUN #2		CORED: 3.0' RECOV.: 0.1'				
	BOULDER OR LAVA ROCK	15	"AX"	RUN #3		CORED: 5.0' RECOV.: 3.0'				
	CLINKER ? REDDISH BROWN CLAYEY SILT	20	2"SS	5A-A	-	-	-	-	-	43/0.5' HAMMER BOUNCES
	BROWN PUKA PUKA ROCK	25	2"SS	5A-B	-	-	-	-	-	50/0.1' HAMMER BOUNCES
	END OF BORING @ 25.1' 3-14-74									

*Elev. Estimated from Grading Plan by Community Planning, Inc. Dated 1/11/74

NEWTOWN REC. CENTER

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: RECREATION AREA (NEWTOWN DEVELOPMENT)
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

HAMMER:
Weight: 140#
Drop: 30"
SAMPLER: 2"SS-2" STANDARD SPLIT SPOON
2"S. 2" O.D. THIN WALL TUBE

BORING NO. G Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date MAR. 8 & 9, 1974
Field Party KAKU, KAU, MEYER, CHOW
Type of Boring AUGER (VERSA DRILL) Diam. 4"
Elev. 375'± * Datum —
Drill Bit T.C. DRAG

Water Level	NOT NOTICED			
Time	—			
Date	3-8-74			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40	2" O.D. THIN WALL TUBE SAMPLER BLOWS/0.5'
	ELEV. = 375'± ↓ *	0									
	STIFF MOTTLED REDDISH BROWN CLAYEY SILT & DECOMPOSED ROCK		2"SS	G-A	—	45	—	—	—		
			2"S	G-B	—	14	—	—	—		10/0.3'
	GRAY DECOMPOSED ROCK	5	2"SS	G-C	—	19	—	—	—		40/0.3' HAMMER BOUNCES
	REDDISH BROWN & GRAY DECOMPOSED ROCK W/SOME SILTY CLAY	10	2"SS	G-D	—	37	—	—	—		
	GRAY, FRACTURED PUKA PUKA ROCK	15	2"SS	G-E	ROCK FRAGMENT						40/0.1' HAMMER BOUNCES
	MOTTLED REDDISH BROWN CLAYEY SILT & DECOMPOSED ROCK	20	2"SS	G-F	—	45	—	—	—		35/0.5' 40/0.2' HAMMER BOUNCES
	MOTTLED BROWN PUKA PUKA DECOMPOSED ROCK	25	2"SS	G-G	—	21	—	—	—		40/0.2'
	DENSE, MOTTLED BROWN SILTY SAND & DECOMPOSED ROCK	30	2"SS	G-H	—	25	—	—	—		50/0.5'
	GRAY, FRACTURED PUKA PUKA ROCK	35	2"SS H	G-I	ROCK FRAGMENT						30/0.0' HAMMER BOUNCES
	END OF BORING @ 40' 3-9-74	40	2"SS H	G-J	NO RECOVERY						30/0.0' HAMMER BOUNCES

*Elev. Estimated from Grading Plan by Community Planning, Inc. Dated 1/11/74

NEWTOWN REC. CENTER

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: RECREATION AREA (NEWTOWN DEVELOPMENT)

LOCATION: Waimalu, Ewa, Oahu, Hawaii

Tax Map Key: 9-8-02: Por. 9

HAMMER:
Weight: 140#
Drop: 30"

SAMPLER: 2" SS - 2" O.D. THIN WALL TUBE
2" SS - 2" STANDARD SPLIT SPOON

BORING NO. 7 Sheet No. ____ of ____

Driller: W. LUM ASSOC., INC. Date: FEB. 20 & 21, 1974

Field Party: KAKU, SHIGENAGA

Type of Boring: ANGER (VERSA DRILL) Diam.: 4"

Elev.: 400'± * Datum: —

Drill Bit: T.G. DRAG

Water Level	NOT NOTICED	NOT NOTICED			
Time	—	—			
Date	2-20-74	2-21-74			

ELEV. = 400'± ▽ * 0

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40	PENETRATION DATA: 2" O.D. THIN WALL TUBE SAMPLER BLOWS/0.5'
(MH)	STIFF, MOTTLED REDDISH BROWN SILTY CLAY W/ DECOMPOSED ROCK	0	2"SS	7-A	-	38	-	-	-		
			2"S	7-B	118	38	85	3390	-		5/0.5' 5/0.5'
MH-CH	STIFF, BROWN & GRAY SILTY CLAY W/ PUKA PUKA ROCK	5	2"SS	7-C	-	47	-	-	-		
	COBBLES OR BOULDER										
(MH)	STIFF MOTTLED BROWN SILTY CLAY W/ DECOMPOSED ROCK	10	2"SS	7-D	-	31	-	-	-		
CH	STIFF, BROWN CLAY	15	2"S	7-E	118	38 39 LL= 100 PL= 36	85	3130 6570	-		6/0.5' 8/0.5'
(MH-CH)	STIFF MOTTLED BROWN SILTY CLAY W/SAND	20	2"SS	7-F	-	36 48	-	-	-		
	MOTTLED BROWN DECOMPOSED ROCK W/SILTY SAND	25	2"S	7-G	112	40	80	-	-		7/0.3'
			2"SS	7-H	-	32	-	-	-		42/0.5'
(CH)	STIFF MOTTLED REDDISH BROWN CLAY W/SAND	30	2"SS	7-I	-	30 55	-	-	-		
	MOTTLED GRAY DECOMPOSED ROCK	35	2"SS	7-J	-	28	-	-	-		47/0.5'
	END OF BORING @ 40.1' 2-21-74	40	2"SS	7-K	ROCK FRAGMENTS						40/0.1' HAMMER BOUNCES

NOTE
LL: LIQUID LIMIT
PL: PLASTIC LIMIT

*Elev. Estimated from Grading Plan by Community Planning, Inc. Dated 1/11/74

NEWTOWN REC. CENTER

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: RECREATION AREA (NEWTOWN DEVELOPMENT)
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

HAMMER: Weight 140#, Drop 30"
SAMPLER: 2"SS - 2" O.D. THIN WALL TUBE; 2"SS - 2" STANDARD SPLIT SPOON

BORING NO. 8 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date FEB. 22, 1974
Field Party KAKU, SHIGENAGA
Type of Boring AUGER (VERSA DRILL) Diam. 4"
Elev. 375'± * Datum —
Drill Bit T.C. DRAG
Water Level NOT NOTICED
Time —
Date 2-22-74

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test / 2" O.D. THIN WALL TUBE SAMPLER — N (Blows per foot) 0 10 20 30 40 — BLOWS/0.5'
	ELEV. = 375'± *	0								
(MH)	STIFF, REDDISH BROWN SILTY CLAY W/ROOTS		2"SS	B-A	–	36 40	–	–	–	
MH	STIFF, REDDISH BROWN SILTY CLAY W/ DECOMPOSED ROCK	5	2"S	B-B	110	43	77	4290	–	4/0.5' 6/0.5'
			2"SS	B-C	–	44 LL= 78 PL= 42	–	–	–	
(MH)	STIFF MOTTLED LIGHT RED BROWN CLAYEY SILT W/ DECOMPOSED ROCK	10	2"S	B-D	–	37	–	–	–	5/0.5' 6/0.5'
	MEDIUM DENSITY MOTTLED GRAY BROWN SILTY SAND & DECOMPOSED ROCK	15	2"SS	B-E	–	33	–	–	–	
	GRAY ROCK FRAGMENTS & DECOMPOSED ROCK (SOME CRUSHES TO SILTY SAND)	20	2"SS	B-F	LITTLE	SAMPLE				40/0.3'
	END OF BORING @ 25.3' 2-22-74	25	2"SS	B-G	–	29	–	–	–	40/0.3'

NOTE
LL= LIQUID LIMIT
PL= PLASTIC LIMIT

*Elev. Estimated from Grading Plan by Community Planning, Inc. Dated 1/11/74

NEWTOWN REC CENTER

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: RECREATION AREA (NEWTOWN DEVELOPMENT)
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

BORING NO. 9 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date FEB. 20, 1974
Field Party KAKU, CHOW, SHIGENAGA
Type of Boring AUGER (VERSA DRILL) Diam. 4"
Elev. 425'± * Datum —
Drill Bit T.C. DRAG

HAMMER:
Weight 140#
Drop 30
SAMPLER: 2" S - 2" O.D. THIN WALL TUBE
2" SS - 2" STANDARD SPLIT SPOON

Water Level				
Time	—			
Date	2-20-74			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40	PENETRATION DATA: 2" O.D. THIN WALL TUBE SAMPLER BLOWS/0.5'
	ELEV. = 425'± *	0									
(MH)	STIFF, MOTTLED REDDISH BROWN & GRAY CLAY W/ ROOTS		2"S	9-A	114	40 36	82	3710	-		3/0.5' 5/0.5'
			2"SS	9-B	-	45	-	-	-		
(MH)	STIFF MOTTLED REDDISH BROWN SILTY CLAY	5	2"S	9-C	111	47	75	8170	-		6/0.5' 8/0.5'
MH	STIFF, REDDISH BROWN & GRAY SILTY CLAY	10	2"SS	9-D	-	50 LL= 84 PL= 44	-	-	-		
	DENSE MOTTLED BLUE GRAY CLAYEY SILT & DECOMPOSED ROCK	15	2"SS	9-E	-	40	-	-	-		23/0.5'
	COBBLES OR BOULDERS	20	2"SS	9-F	ROCK		FRAGMENTS				40/0.1' HAMMER BOUNCES
(MH)	STIFF LIGHT REDDISH BROWN CLAYEY SILT W/ DECOMPOSED ROCK	25	2"SS	9-G	-	40 44	-	-	-		28/0.5' 40/0.4
(MH)	STIFF, MOTTLED BROWN CLAYEY SILT (DECOMPOSED ROCK)										
	END OF BORING @ 26.4' 2-20-74										

NOTE
LL= LIQUID LIMIT
PL= PLASTIC LIMIT

*Elev. Estimated from Grading Plan by Community Planning, Inc. Dated 1/11/74

RECREATION AREA (NEWTOWN DEVELOPMENT)

TABLE I A - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	2		3	3
SAMPLE NO.			B	D
DEPTH BELOW SURFACE	SURFACE		2.5'-4'	10'-11.5'
DESCRIPTION	MOTTLED REDDISH-BROWN SILTY CLAY		MOTTLED REDDISH-BROWN SILTY CLAY W/TRACES OF DECOMP ROCK	MOTTLED BROWN CLAYEY SILT W/DECOMP. ROCK
GRAIN-SIZE ANALYSIS (% Passing) Sieve				
1"				
1/2"				
#4				
#10				
#20				
#40				
#100				
#200				
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL		NATURAL	NATURAL
Liquid Limit	64		74	64
Plastic Limit	34		38	51
Plasticity Index	30		36	13
Dilatancy	MEDIUM		MEDIUM	QUICK
Toughness	MEDIUM		MED.-HIGH	SLIGHT
Dry Strength	MEDIUM		MEDIUM	SLIGHT-MED
UNIFIED SOIL CLASSIFICATION	MH		MH	MH
APPARENT SPECIFIC GRAVITY				
CBR TEST (Surcharge-51 P.S.F.)				
Molding Moisture, %	33.3			
Molding Dry Density, P.C.F.	87.8			
Swell upon saturation, %	0.3			
CBR at 0.1" Penetration	8.3			
MOISTURE-DENSITY RELATIONS OF SOILS (AASHO T-180-73I, Method ___)				
Dry to Wet or Wet to Dry				
Max. Dry Density (P.C.F.)				
Optimum Moisture (%)				

REMARKS:

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 3-23-72 By BT

3-1273

RECREATION AREA (NEWTOWN DEVELOPMENT)

TABLE I B - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	3	3	7	7
SAMPLE NO.	F	G		E
DEPTH BELOW SURFACE	20'-21.5	25'-27'	SURFACE	15'-16'
DESCRIPTION	MOTTLED BROWN & GRAY CLAYEY SILT W/DECOMP ROCK	MOTTLED BROWN CLAYEY SILT W/SAND & DECOMP ROCK	REDDISH-BROWN SILTY CLAY	BROWN CLAY
GRAIN-SIZE ANALYSIS (% Passing) Sieve				
1"				
1/2"				
#4				
#10				
#20				
#40				
#100				
#200				
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL	NATURAL	NATURAL	NATURAL
Liquid Limit	61	71	69	100
Plastic Limit	42	42	35	36
Plasticity Index	19	29	34	64
Dilatancy	MEDIUM	MEDIUM	NONE	NONE
Toughness	MED.-SLIGHT	MEDIUM	MEDIUM	MED.-HIGH
Dry Strength	SLIGHT-MED.	SLIGHT-MED.	MED.-HIGH	HIGH
UNIFIED SOIL CLASSIFICATION	MH	MH	MH	MH
APPARENT SPECIFIC GRAVITY			2.78	
CBR TEST (Surcharge-51 P.S.F.)				
Molding Moisture, %			32.1	
Molding Dry Density, P.C.F.			88.8	
Swell upon saturation, %			1.7	
CBR at 0.1" Penetration			9.4	
MOISTURE-DENSITY RELATIONS OF SOILS (AASHO T-180-73I, Method ___)			A	
Dry to Wet or Wet to Dry			DRY TO WET	
Max. Dry Density (P.C.F.)			91	
Optimum Moisture (%)			32	

REMARKS:

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 3.23.74 By BT

3-1273

RECREATION AREA (NEWTOWN DEVELOPMENT)

TABLE I.C - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	8	8		9
SAMPLE NO.		C		D
DEPTH BELOW SURFACE	SURFACE	5'-6.5'		10'-11.5'
DESCRIPTION	REDDISH-BROWN SILTY CLAY W/ROOTS	REDDISH-BROWN SILTY CLAY W/DECOMP ROCK		REDDISH-BROWN & GRAY SILTY CLAY
GRAIN-SIZE ANALYSIS (% Passing) Sieve				
1"	100			
1/2"	99.1			
#4	98.6			
#10	97.9			
#20	97.2			
#40	96.8			
#100	96.3			
#200	95.9			
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL	NATURAL		NATURAL
Liquid Limit	66	78		84
Plastic Limit	34	42		44
Plasticity Index	32	36		40
Dilatancy	MEDIUM	MEDIUM		MEDIUM
Toughness	MEDIUM	MEDIUM		MED.-HIGH
Dry Strength	MEDIUM	MEDIUM		MED.-HIGH
UNIFIED SOIL CLASSIFICATION	MH	MH		MH
APPARENT SPECIFIC GRAVITY	2.75			
CBR TEST (Surcharge-51 P.S.F.)				
Molding Moisture, %	34.4			
Molding Dry Density, P.C.F.	86.9			
Swell upon saturation, %	0.5			
CBR at 0.1" Penetration	11.0			
MOISTURE-DENSITY RELATIONS OF SOILS (AASHO T-180-73I, Method ___)	A			
Dry to Wet or Wet to Dry	DRY TO WET			
Max. Dry Density (P.C.F.)	89			
Optimum Moisture (%)	32			

REMARKS:

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

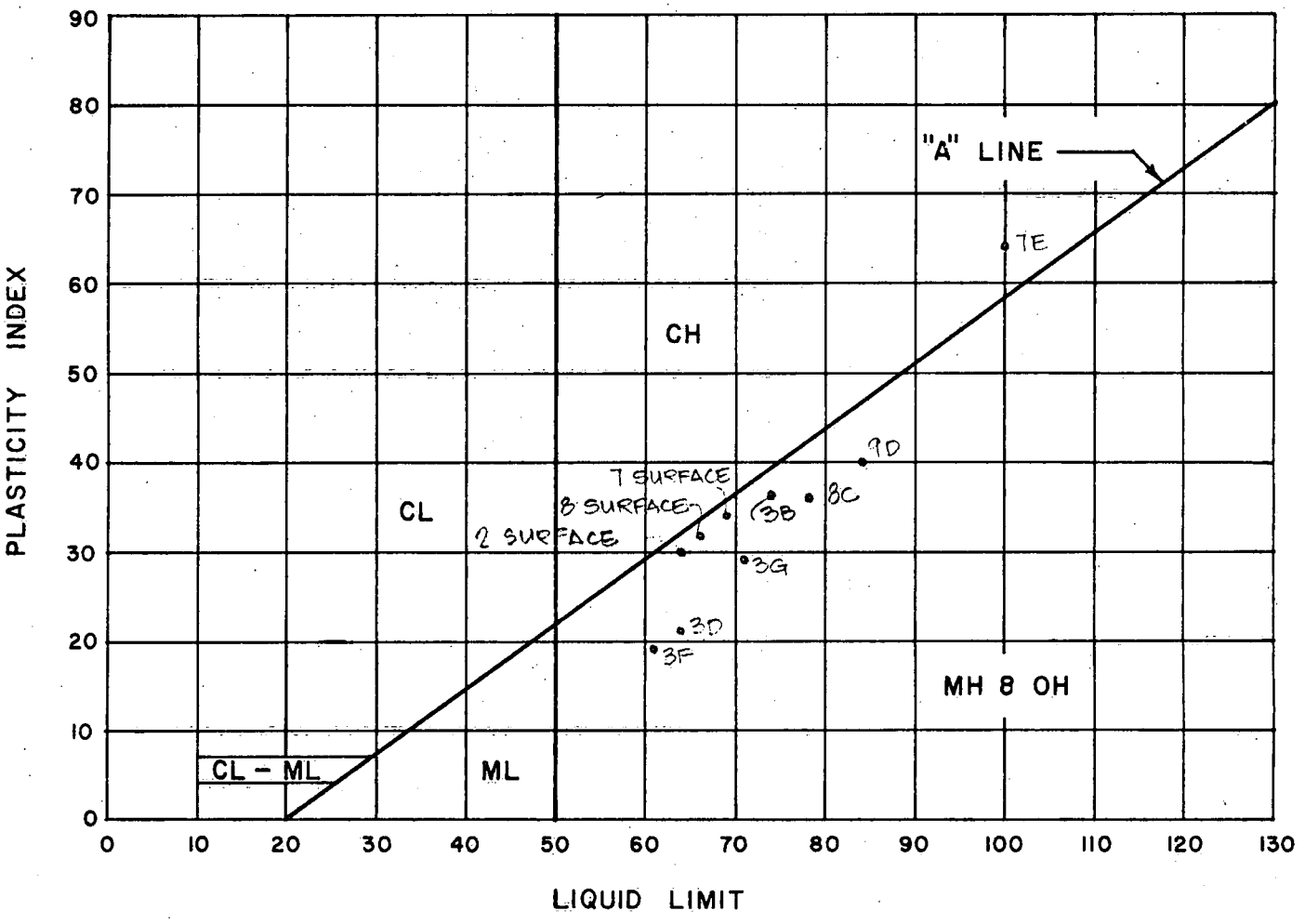
Date 3-23-74 By BT

3-1273

PLASTICITY CHART

PROJECT: RECREATION AREA (NEWTOWN DEVELOPMENT)

LOCATION: WAIMALU, EWA, OAHU, HAWAII



DATE _____ BY _____

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

8-872

MOISTURE–DENSITY CURVE (AASHO T-180-73I, METHOD A)

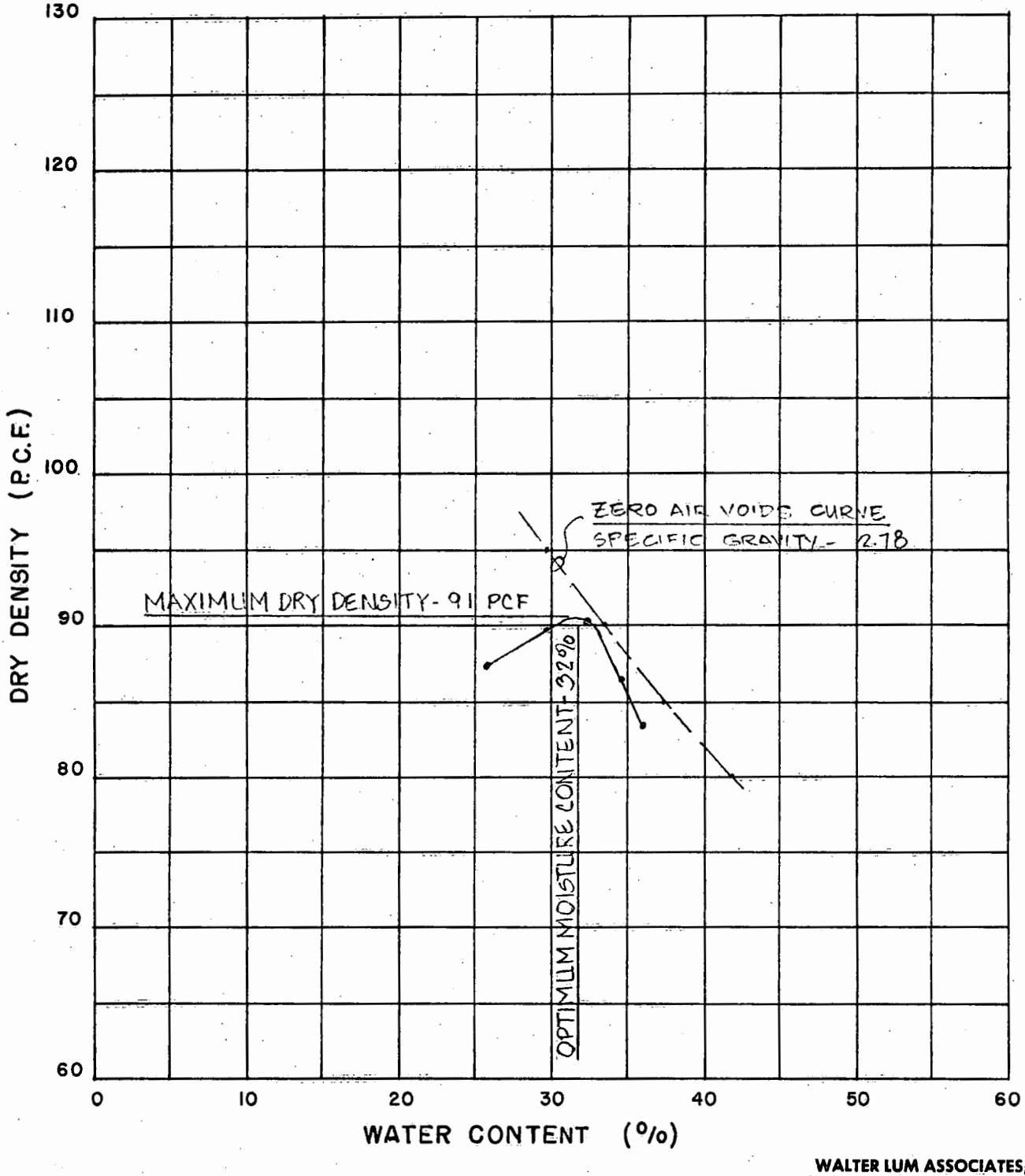
PROJECT: RECREATION AREA (NEWTOWN DEVELOPMENT)

LOCATION: WAIMALU, EWA, OAHU HAWAII

SAMPLE NO.: 7 SURFACE

SAMPLE DESCRIPTION: REDDISH-BROWN SILTY CLAY

AGGREGATE: 1/4" MINUS
MOLD SIZE: 4" Φ X 4.584" HIGH
HAMMER: 10 LBS 18" DROP
LAYERS: 5
BLOWS: 25/ LAYER



WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

DATE 3-19-74 BY JS

MOISTURE–DENSITY CURVE (AASHO T-180-73I, METHOD A)

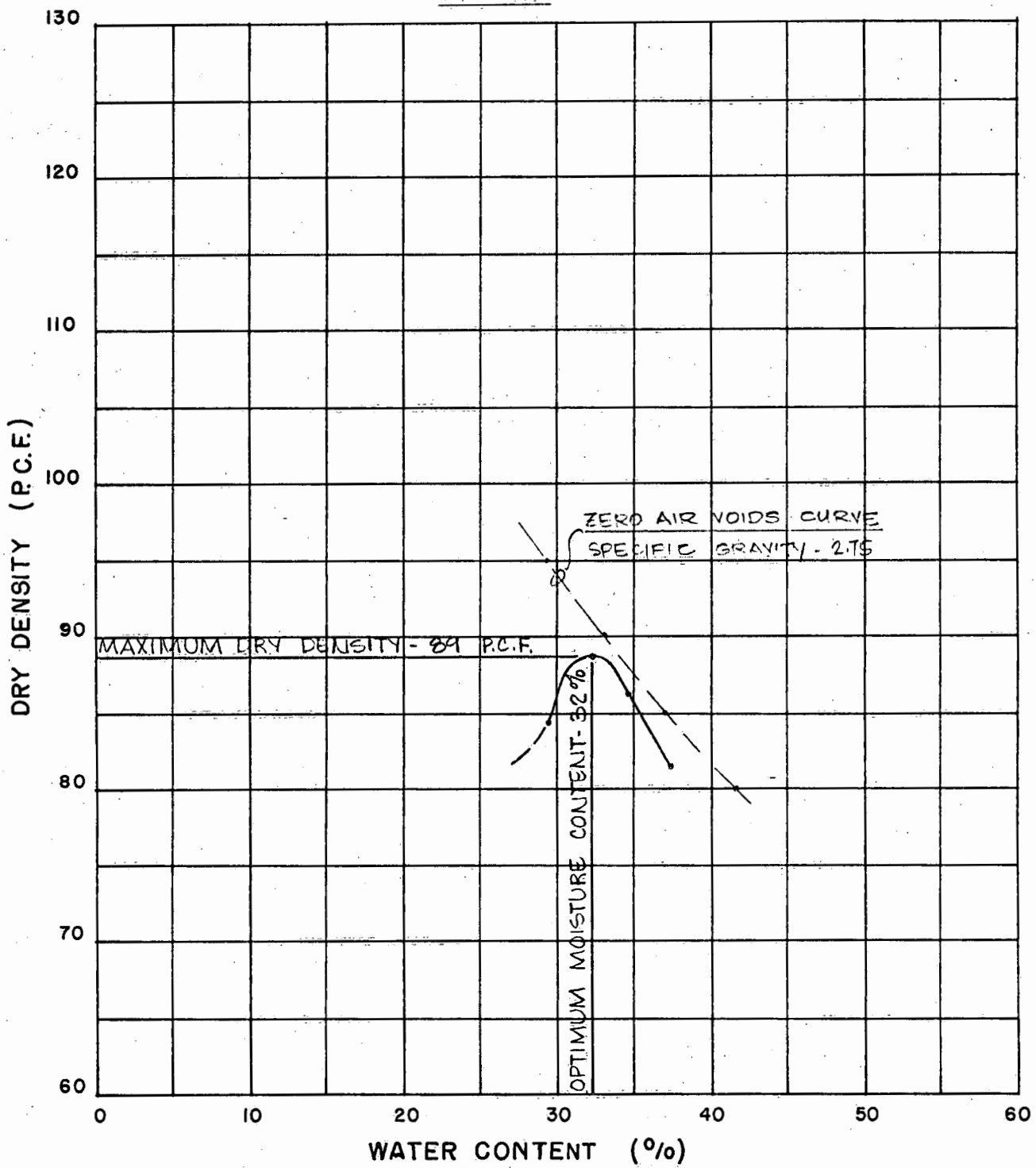
PROJECT: RECREATION AREA (NEWTOWN DEVELOPMENT)

LOCATION: WAIMALU, EWA, OAHU, HAWAII

SAMPLE NO.: B SURFACE

SAMPLE DESCRIPTION: REDDISH-BROWN SILTY CLAY W/ROOTS

AGGREGATE: ¼" MINUS
MOLD SIZE: 4"ϕ X 4.584" HIGH
HAMMER: 10 LBS. 18" DROP
LAYERS: 5
BLOWS: 25/LAYER



WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

DATE 3-1-74 BY NI

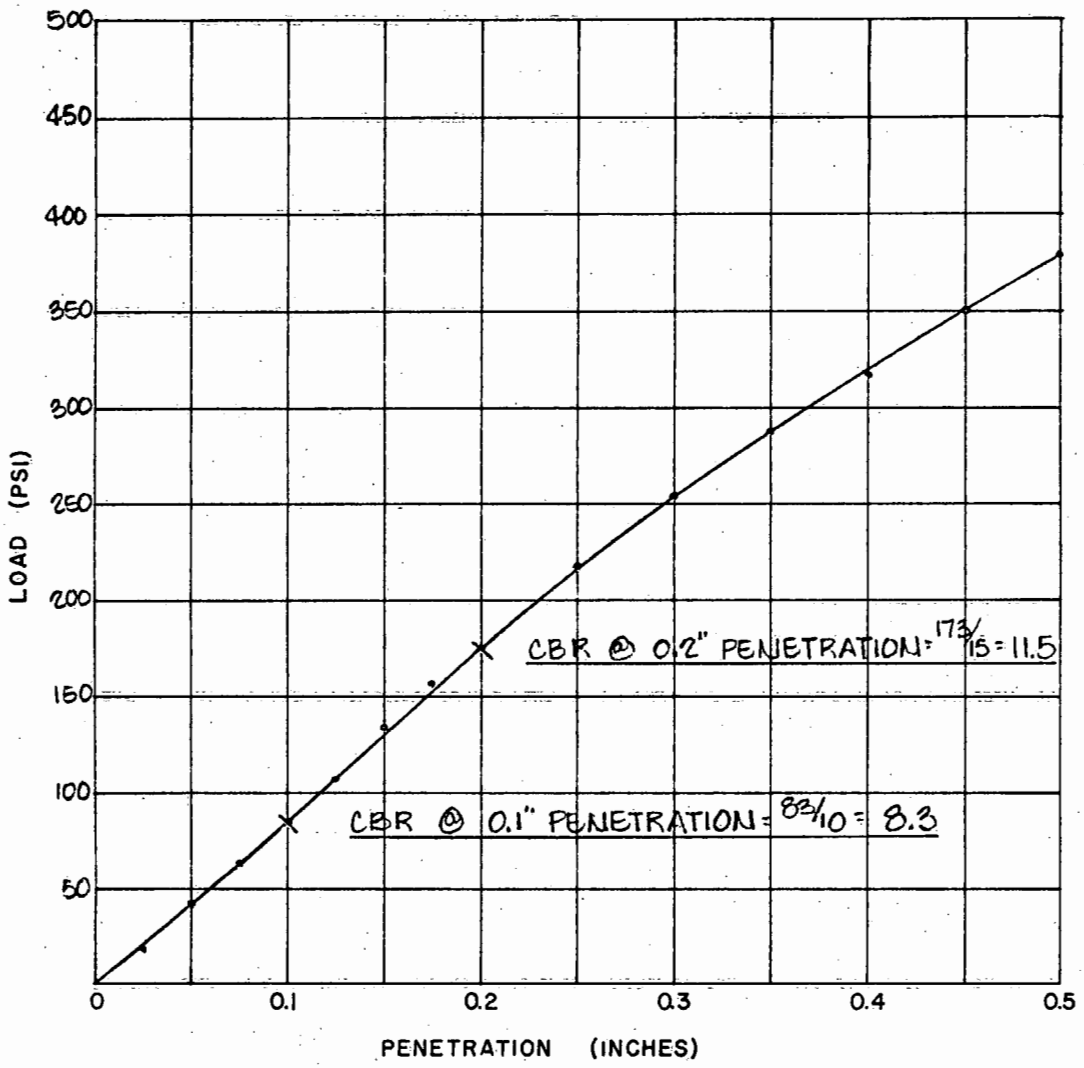
CBR TEST

PROJECT: RECREATION AREA (NEWTOWN DEVELOPMENT)

LOCATION: WAIMALU, EWA, OAHU, HAWAII

SAMPLE NO: 2 SURFACE

SAMPLE DESCRIPTION: MOTTLED REDDISH-BROWN SILTY CLAY



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS.)	LOAD (PSI)
0.025	50	17
0.050	120	40
0.075	190	63
0.100	250	83
0.125	320	107
0.150	400	133
0.175	470	157
0.200	520	173
0.250	650	217
0.300	760	253
0.350	860	287
0.400	950	317
0.450	1050	350
0.500	1140	380

AGGREGATE 1/4" MINUS
HAMMER WEIGHT 10 LBS.
HAMMER DROP 18 INS.
No. OF BLOWS 56/LAYER
No. OF LAYERS 5

TEST RESULTS:

MOLDING MOISTURE, %. 33.3
MOLDING DRY DENSITY, P.C.F. 87.8
CBR @ 0.1" PENETRATION 8.3
DAYS SOAKED 4

DATE 3-4-74 BY GS
DATE 3-5-74 BY NI

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

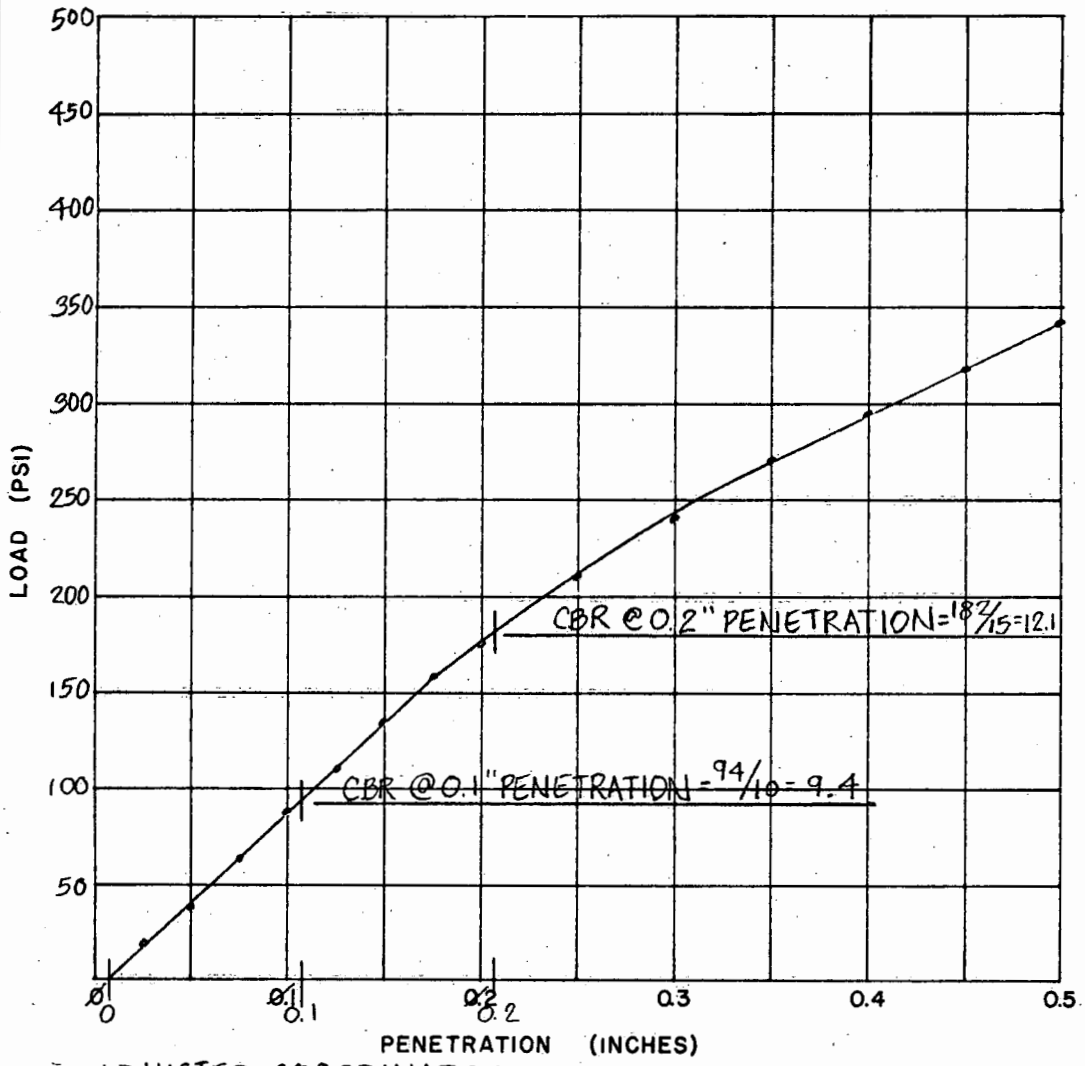
CBR TEST

PROJECT: RECREATION AREA (NEWTOWN DEVELOPMENT)

LOCATION: WAIMALU, EWA, OAHU, HAWAII

SAMPLE NO: 7 SURFACE

SAMPLE DESCRIPTION: REDDISH-BROWN SILTY CLAY



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS.)	LOAD (PSI)
0.025	50	17
0.050	110	37
0.075	190	63
0.100	260	87
0.125	330	110
0.150	400	133
0.175	470	157
0.200	520	173
0.250	630	210
0.300	720	240
0.350	810	270
0.400	880	293
0.450	950	317
0.500	1020	340

AGGREGATE 1/4" MINUS

HAMMER WEIGHT 10 LBS

HAMMER DROP 18 INS

No. OF BLOWS 56/LAYER

No. OF LAYERS 5

ADJUSTED COORDINATES

TEST RESULTS:

MOLDING MOISTURE, %. 32.1

MOLDING DRY DENSITY, P.C.F. 88.8

CBR @ 0.1" PENETRATION

DAYS SOAKED 4

DATE 3-12-74 BY RH

DATE 3-13-74 BY JS

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

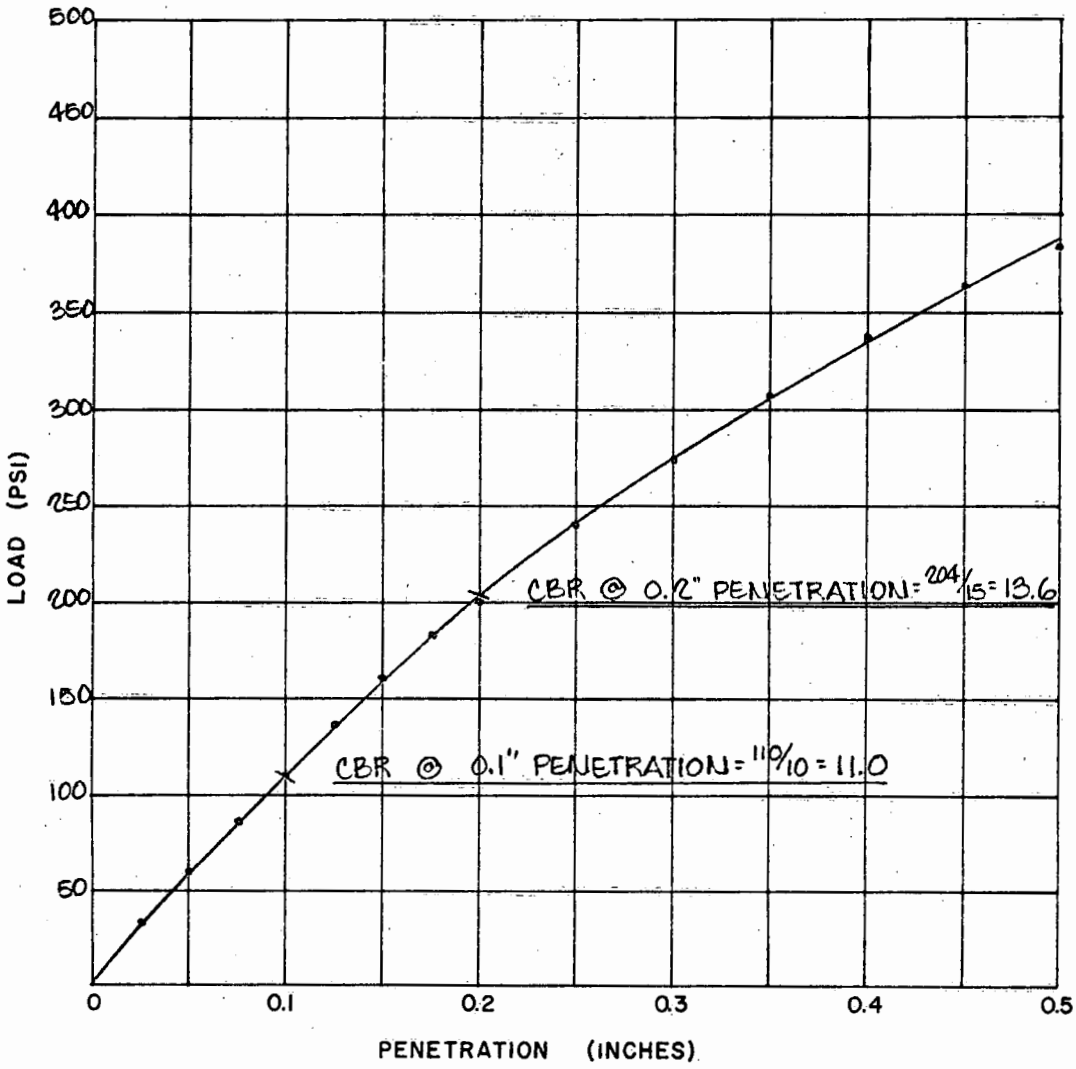
CBR TEST

PROJECT: RECREATION AREA (NEWTOWN DEVELOPMENT)

LOCATION: WAIMALU, EWA, OAHU, HAWAII

SAMPLE NO: 8 SURFACE

SAMPLE DESCRIPTION: REDDISH-BROWN SILTY CLAY W/ROOTS



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS)	LOAD (PSI)
0.025	100	33
0.050	180	60
0.075	260	87
0.100	330	110
0.125	410	137
0.150	480	160
0.175	550	183
0.200	600	200
0.250	720	240
0.300	820	273
0.350	920	307
0.400	1010	337
0.450	1090	363
0.500	1150	383

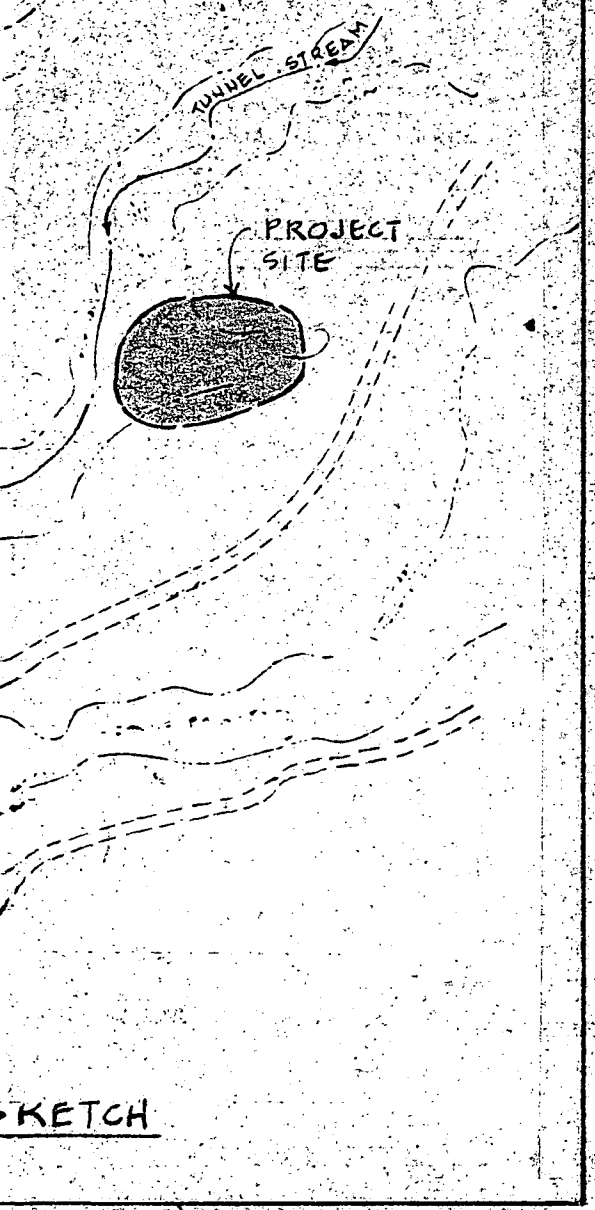
AGGREGATE 1/4" MINUS
HAMMER WEIGHT 10 LBS.
HAMMER DROP 18 INS.
No. OF BLOWS 56/LAYER
No. OF LAYERS 5

TEST RESULTS:

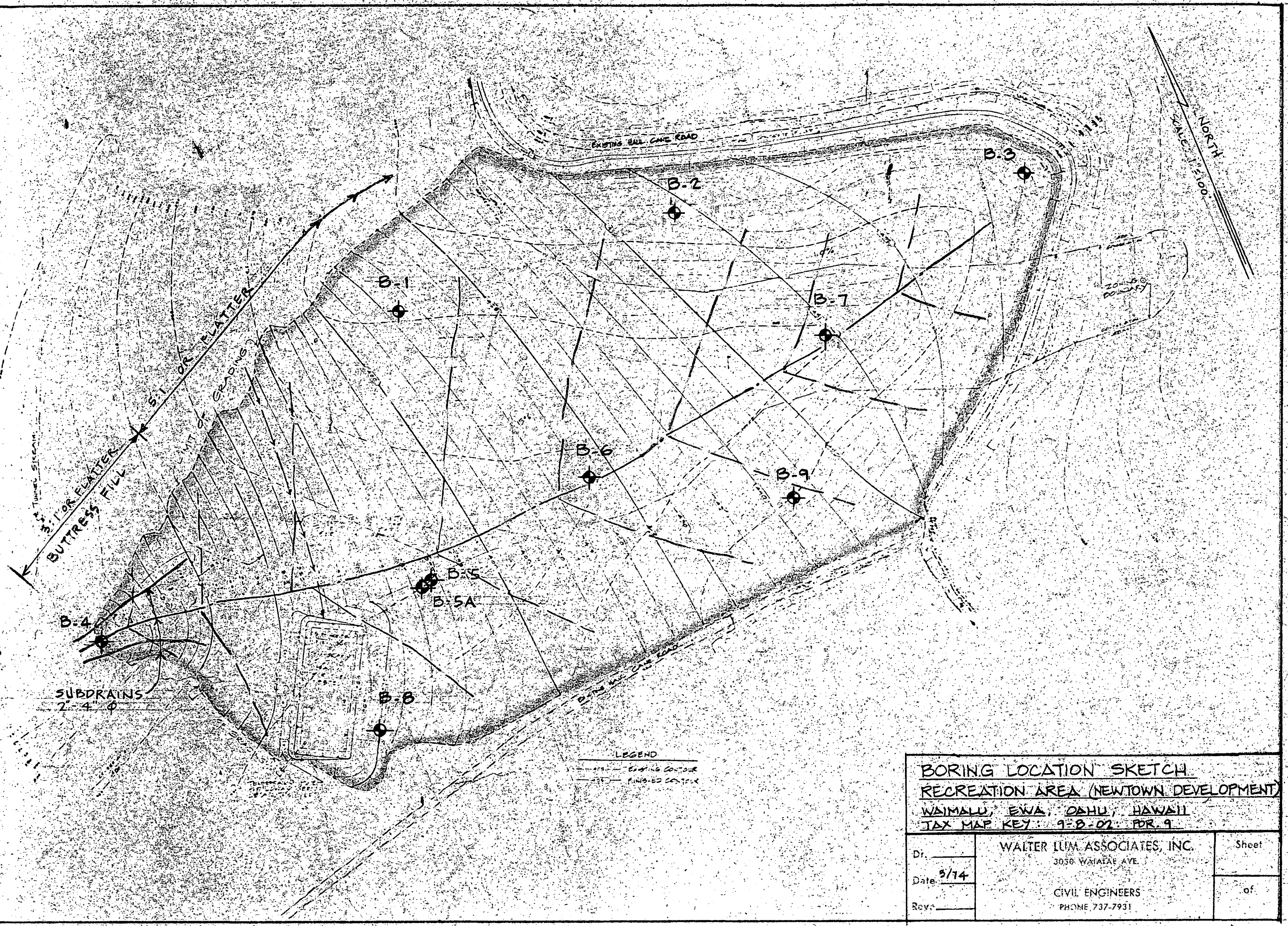
MOLDING MOISTURE, %. 34.4
MOLDING DRY DENSITY, P.C.F. 86.9
CBR @ 0.1" PENETRATION 11.0
DAYS SOAKED 4

DATE 3-4-74 BY GS
DATE 3-5-74 BY NI

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS



KETCH



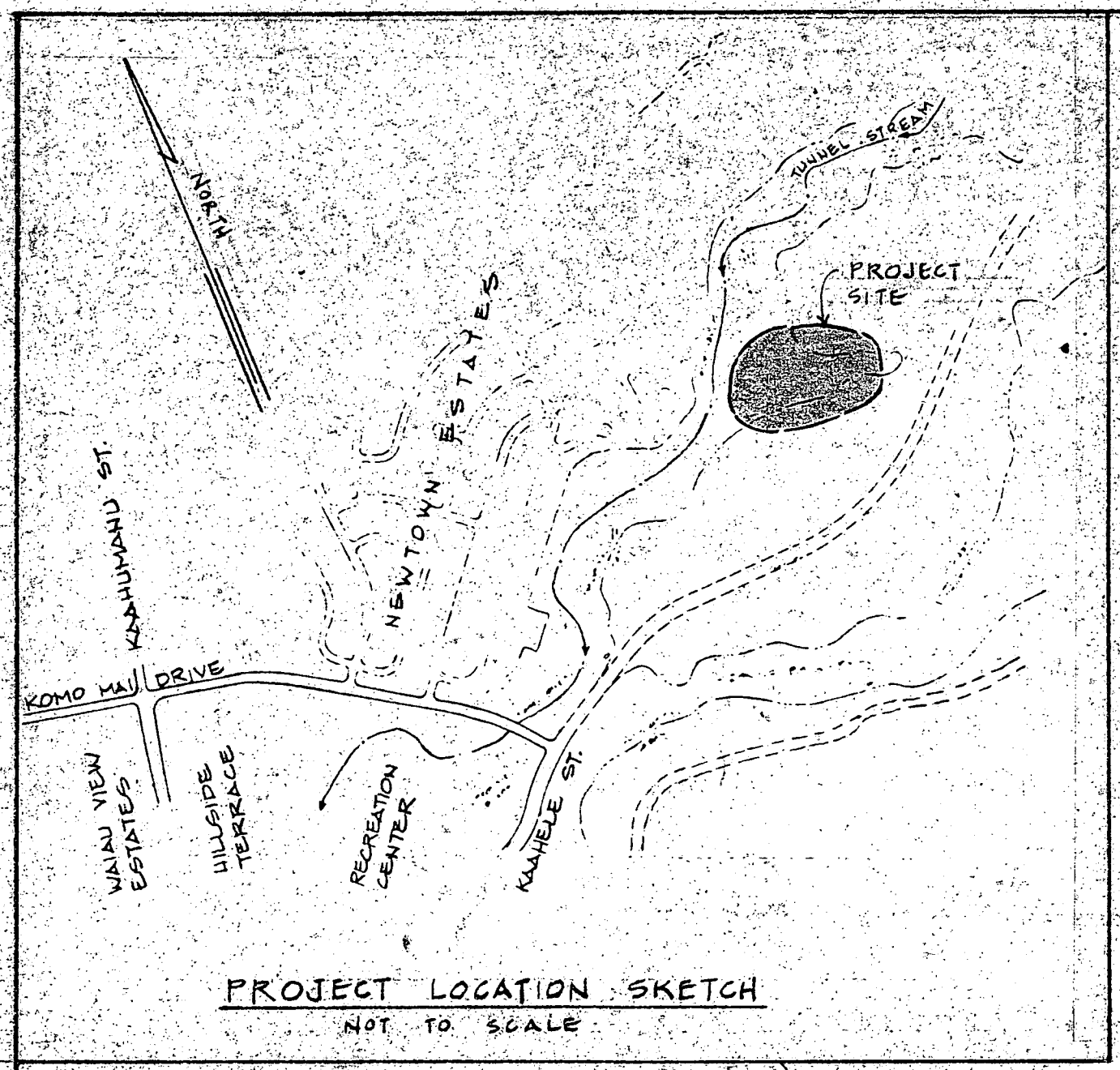
BORING LOCATION SKETCH

RECREATION AREA (NEWTOWN DEVELOPMENT)

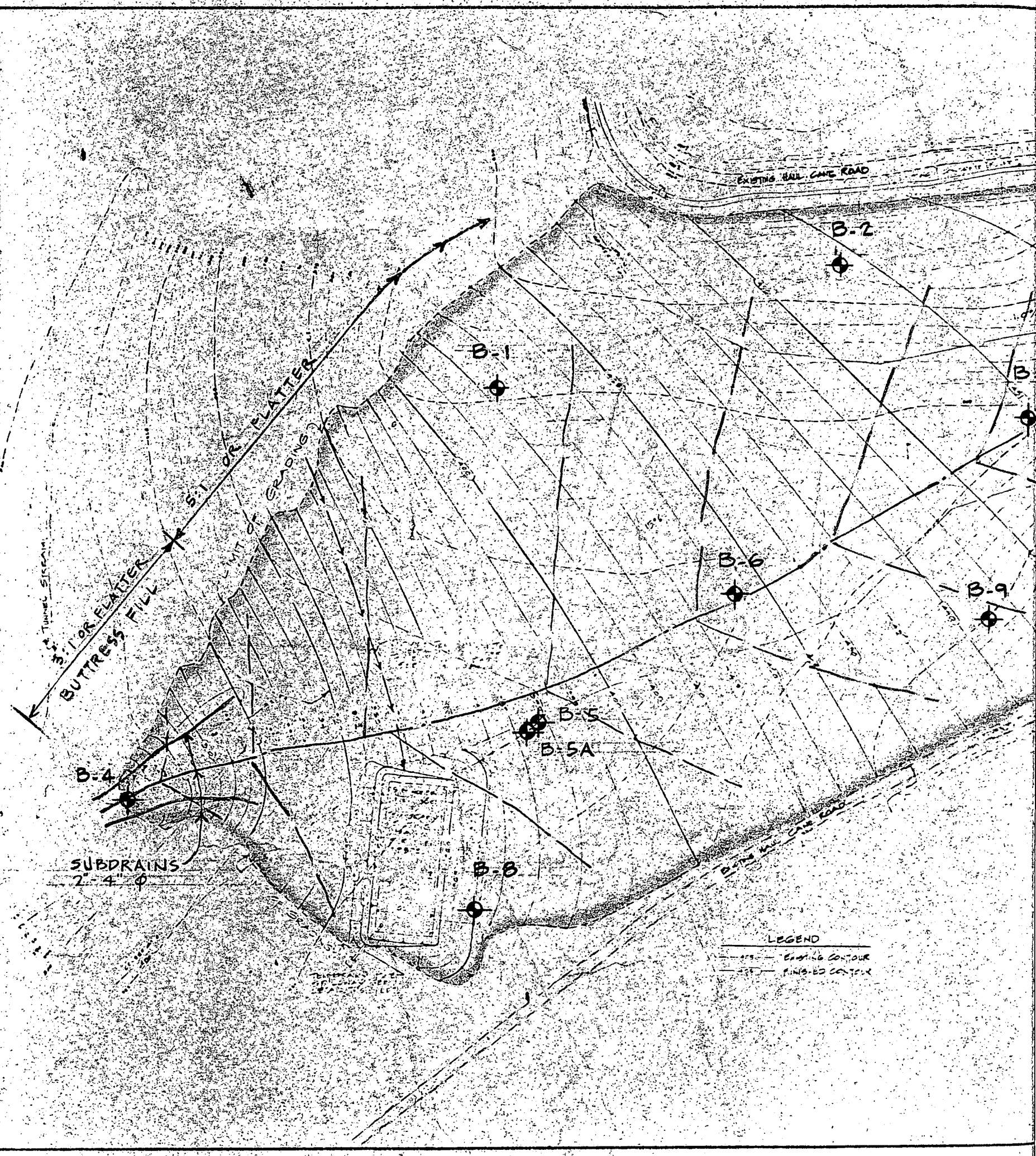
WAIMALU, EWA, OAHU, HAWAII

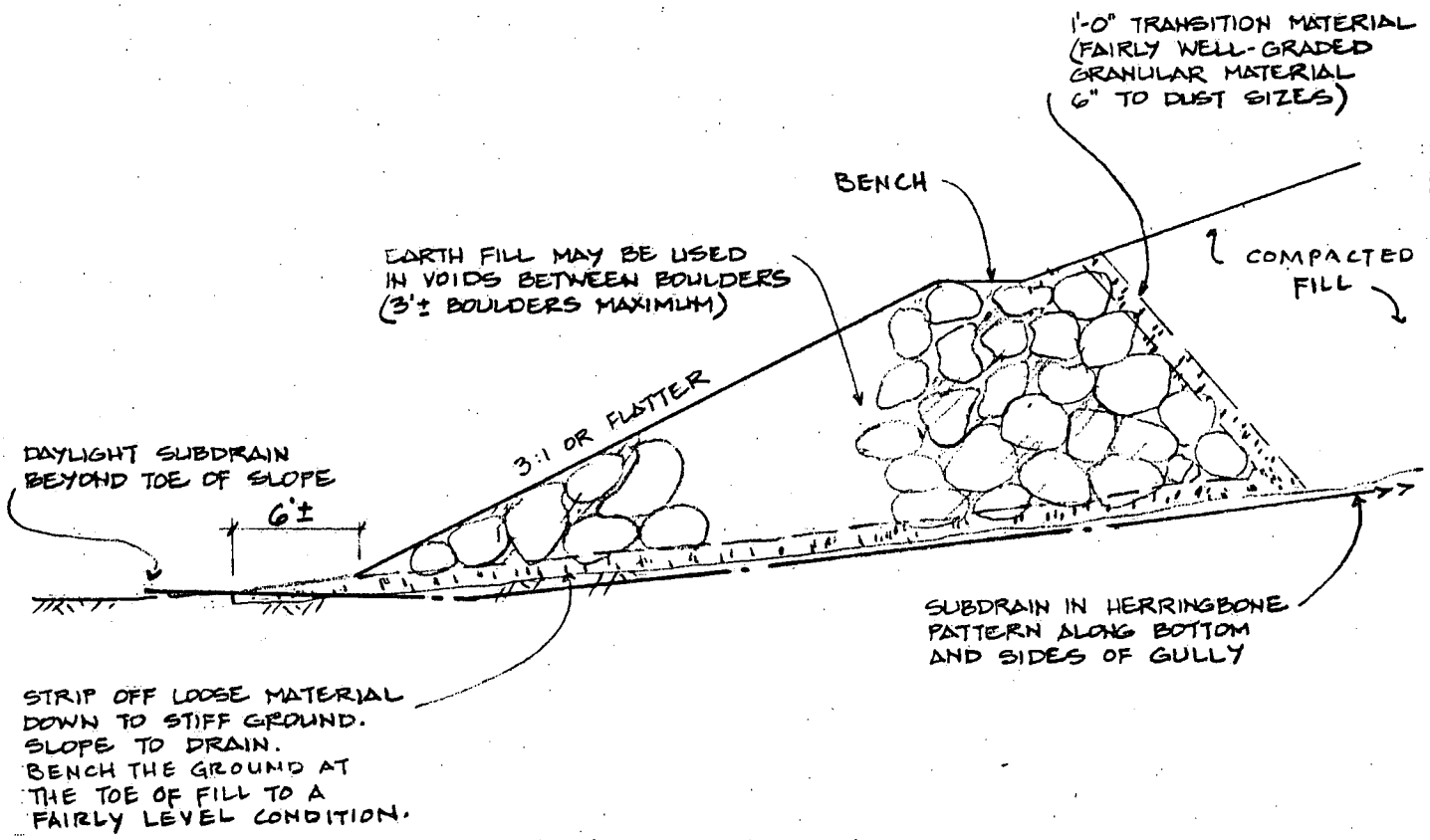
TAX MAP KEY: 9-8-02: POR. 9

Dr.	WALTER LUM ASSOCIATES, INC.	Sheet
Date 5/74	3030 WAIALAE AVE.	
Rev.	CIVIL ENGINEERS	of
	PHONE 737-7931	



PROJECT LOCATION SKETCH
NOT TO SCALE





SCHEMATIC SECTION

NOT TO SCALE

FIGURE 1

SCHEMATIC SECTION · BOULDER FILL

RECREATION AREA (NEWTOWN DEVELOPMENT)

WAIMALU, EWA, OAHU, HAWAII

TAX MAP KEY: 9-8-02: POR. 9

WALTER LUM ASSOCIATES, INC.

CIVIL, STRUCTURAL, SOILS ENGINEERS

LIMITATIONS

In general, soil formations are commonly erratic and rarely uniform or regular. The boring logs indicate the approximate subsurface soil conditions encountered only at the drill holes where the borings were made at the times designated on the logs and may not represent conditions at other locations or at other dates. Soil conditions and water levels may change with the passage of time and construction methods or improvements at the site.

During construction, should subsurface conditions much different from those in the borings be observed, encountered, or otherwise indicated, we should be advised immediately to review or reconsider our recommendations in light of the new developments.

If there is a substantial lapse of time between the submission of this report and the start of work at the site, or if conditions have changed due to natural causes, plan changes, or construction operations at or adjacent to the site, it is recommended that this report be reviewed to determine the applicability of the recommendations considering the time lapse, changed conditions, and changes in the state of the art of soil engineering.

Our professional services were performed, findings obtained and recommendations prepared in accordance with generally accepted engineering practices. This warranty is in lieu of all other warranties expressed or implied.